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RADIO ENGINEERING TEXTBOOK CRITICIZED

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(Review of M. I. Zemlyanov's Radiotekhnika. (Radio Engineering), published by Academy of Armored and Mechanized Forces of the Soviet Army imeni I. V. Stalin, Moscow, 1948.)

M. I. Zemlyanov has successfully arranged the contents and structure of his book to facilitate the teaching of the operation of special radio equipment.

Chapter 1 is a general survey of basic electrical concepts. Conductors, insulators, and simple electrical fields are examined in detail; the concept of potential is omitted.

Chapters 2 and 3 take up the physical processes which enter into interrupted and continuous oscillator circuits and give elementary information on the propagation of radio waves in the ionosphere. The concept of the density of magnetic flux is confused by the author, who indicates that magnetic fields grow at the axis of a conductor, whereas they actually collapse. He incorrectly maintains that the influence of ionization on wave propagation is greater, the less the ionization. If this statement were correct, the complete absence of ionization would be the most favorable condition for wave propagation. Of course, his next statements contradict this assertion.

Chapter 4 examines the properties of vacuum tubes. Among the defects is the oversimplification of the concept of the work function. Likewise, too much attention is given to the work of oscillators.

Chapter 6 [sic] acquaints the reader with radio transmitters. The problems of neutrodynes and the stabilization of frequencies are studied. The author incorrectly writes that in quartz stabilization in short waves frequency doubling is optional, and that the separation of one of the upper harmonics and its utilization for stabilization is possible.

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Chapter 7 deals with radio telephonic transmission. The title of the chapter is broader than its actual contents. First, the theory of modulation is given. The work of various systems of amplitude modulation are then analyzed. Finally, a short presentation of frequency modulation is given.

Omitting the concept of nonlinear resistance, the author cannot give a clear presentation of the physcial aspects of the processes of modulation We cannot agree with the statement that the current in microphones, which are considered as linear resistances, can be said to be modulated. Actually, in modulated oscillations, the modulated frequency should be less than the carrier frequency, and the presence of nonlinear resistance is essential. Neither of these conditions are found in microphone circuits.

The definition of frequency modulation as "a process for modulating the frequencies of high-frequency oscillations according to the principle of sound reaction" is poor. The student, reading about the development of side frequencies in amplitude modulation, will not get the meaning. We must emphasize the fact that the amplitude of audio oscillation has no effect on the phase of high frequencies, but that it is basic to frequency modulation.

Chapter 8 examines receiving sets. Detection, amplification of high and low frequenices, operation of heterodyne and superheterodyne receiving sets, autodyne receiving sets and certain automatic controls are studied. The author defines intermediate frequencies as the sum or the difference of signal and heterodyne frequencies. Actually, intermediate frequencies are equal to the absolute value of the difference of the frequencies.

At the end of the book a description of the operating set-up of four radio broadcasting stations is given.

Many times the author's choice of words is poor. The term "demodulation" is widely, but incorrectly, used in radio engineering literature. Actually, the process of demodulation, as opposed to the process of modulation, implies the separation of continuous high-frequency oscillations from sound frequencies. The radio engineering value of the process lies in the recovery of sound frequencies, whereas the continuous high-frequency oscillations thus received are the "waste products" of this process.

The complete absence of historical material is a serious shortcoming of the book. A. S. Popov, inventor of the radio, is not even once mentioned. Secondary foreign investigators are, however discussed.

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